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How redesigning our first-year labs grew into a “Gesamtkunstwerk” in Physics Education

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In this talk, we'll tell the story of how an initial idea for course redesign grew into something much bigger, incorporating ideas from Physics Education research and the Physics Education community, design of learning spaces, SOTL (scholarship of teaching and learning), building a community of practice etc. along the way –thus “Gesamtkunstwerk”. We will describe how funding for teaching lab renovation and new equipment was combined with turning the lab courses from cookbook style to inquiry-based, including group work with assigned roles, and in-class feedback and assessment. The design team, in consultation with a large number of faculty members, shifted the learning focus towards a more reflective approach to making measurements and analyzing data, and made an introduction to the iterative process of doing science explicit in the course learning goals. This focus allowed much shorter lab instructions, now completely online instead of printed, which required thorough exploration of the technical possibilities of our learning management system, Canvas. We tested our original design in a two-stage process involving faculty, high school/first year students and grad students, using pre-/post-tests, focus groups and observations. We'll show examples for the labs, results from the two-stage testing (specifically on alignment of the activities and assessment methods with the learning goals) and how they were included in the course design, as well as observations from the first round of implementations. We'll also point out some spin-off projects, such as the need for an Excel tutorial and restructuring of the teaching materials archive.

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